

Cleantech take off

- A Business Perspective on Climate Change

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Abstract — Climate change dynamics enables a number of new companies and businesses to emerge. With a point of departure in Geels' multi-level perspective model [1], conceptualizing the landscape Cleantech companies operate in, this paper looks into what it takes for a niche company to be able to manoeuvre, evolve and mature. Cleantech Niche Development is defined as a way of acting which enables Cleantech companies to move up in the Cleantech landscape. A company that manages to perform successful Cleantech Niche Development will be able to have an environmental and economic sustainable business with prospects to a future without subsidies, enabling them to compete with companies from the dominant regime. The empirical background work has been six qualitative interviews with niche Cleantech companies, Cleantech networks and governmental institutions. By combining theory and empirical material, Cleantech Niche Development is found to distinguish itself (from general niche development) in the following five elements; cleantech marketing, political aspects, networking, strategizing and social relations. The overall competences the Cleantech leaders should possess also encompasses the ability to act in chaos upon the paradoxical and complex surroundings while making meaning for their companions and network.

Keywords — Business development, Cleantech Leadership, Niche, SME

1 INTRODUCTION

Small Businesses with cleantech products and services will need to contribute to a sustainable new energy production. Cleantech Niche Management will be central and this paper is an attempt to kick start the research on what it takes for Cleantech niche companies to “take off” towards the new socio technical constellation needed in energy production, the new regime [1].

With a point of departure in Geels' multi-level perspective model [1], which is an evolutionary model, the aim of this paper is to conceptualise how a niche company can manoeuvre, evolve and mature in this framework and adapt to or even change the market conditions and thereby contribute to the transition into a future new climate responsible economy.

This article has an enterprise perspective; the point of departure is in the companies but do not only in a single company or companies within a single Cleantech industry. The aim is to conceptualise cleantech leadership across cleantech industries, building on the contention that the

individual Cleantech niches have some overall characteristics, which Geels also argues [1].

The article commences with a method section and continues by presenting Geels three level model as concept for understanding a cleantech industry. Then follows the conceptualisation and modeling of cleantech niche development, which draws on element from management, organisation, leadership, network and entrepreneurship literature. The final model consists of three main elements: Leadership, micro niche management and business development. In the discussion a special emphasis is put on networking, strategizing and cleantech marketing.

2 METHOD

The paper adopts the interpretive paradigm [2]. Theory [1], [3]), is combined with a national empirical report [4] and six interviews. The interviews were conducted as semi structured. Two enterprises were interviewed, Innogie and HS Wind. Both are small companies. This was combined with four interviews with institutional players; the ministry of climate and energy, Østjysk Innovation (a regional investment fund for SMEs), EU DP (an energy development program) and “Climate circle” a network for cleantech players. The interview was used as background material in developing the concepts around cleantech leadership.

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3 THE CLEANTECH INDUSTRY – TRANSITIONS THEORY

Cleantech is not just one business or one market – Cleantech cuts across sectors and technologies. [4]:7 defines it as follows:

“Cleantech is activities that develops (including consultancy and research), manufactures or implement new or improved processes or products contributing to:

- Producing renewable energy or materials
- Reducing use of natural resources by utilizing resources or energy more effectively
- Reducing the harm caused by fossil fuels
- Reducing pollution problems through products, processes and / or advice” (Authors translation)

Pernick & Wilder defines the cleantech industry in a broadly similar manner [5]. Geel’s perspective on the Cleantech scenery views it as a multi-level phenomenon [1]. Geels is specifically focusing on transitions at the level of society – which the transition from conventional technologies, products and services to Cleantech technologies, products and services lies within. Societal functions are constructed by social technical systems “which consists of a cluster of aligned elements, e.g., artifacts, knowledge, markets, regulation, cultural meaning, infrastructure, maintenance networks and supply networks” [1]Geels (2005:445). So as mentioned before – it is complex, many aspects influences a Cleantech Leader.

Geels has three main levels in his multi-level perspective [1] (Geels, 2005, p 683-684):

- **The macro-level** is formed by the sociotechnical landscape, which affects sociotechnical development such as globalization, environmental problems and cultural changes. The sociotechnical landscape is beyond the direct influence of actors and cannot be changed at will.
- **The meso-level** – Is formed by sociotechnical regimes. Sociotechnical regimes do not only refer to groups of engineers or firms but also to other social groups. These groups actively maintain the Sociotechnical systems as a paradigm. This leads to a system that only creates innovations of an incremental nature leading to technical trajectories and path dependencies. This is also called the dominating regime.
- **The micro-level** is formed by technological niches. It is in the niches the radical innovations is to be found. These niches emerge in protected spaces as their

performance initially is low; these spaces shield them from mainstream market selection. The niches provide a space for social networking which support innovations. That the niches work in these protected spaces implies that they can work under the radar of the meso-level and under non market conditions.

Geels (2005) also point at that several niches and several regimes might be in competition, as in the electricity production, where several fossil fuels and district heating are dominant regimes, whereas new renewable energy production technology and businesses like photovoltaic, windturbines and thermal heating are competing niches both challenging each other and the dominant regimes. The relation between these three levels can be described with the below model – showing that regimes are embedded within the landscapes and niches within the regimes.

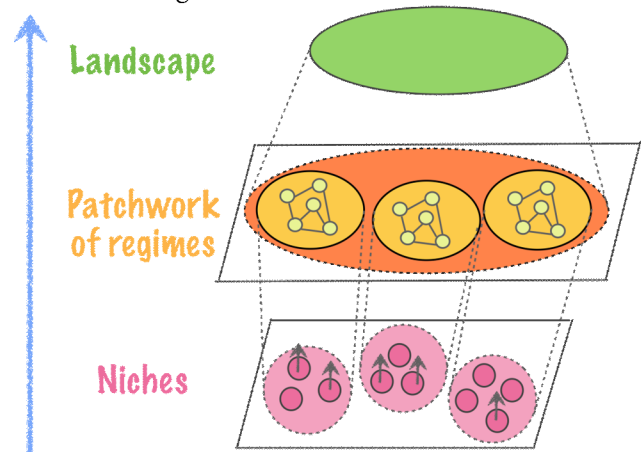


Figure 1. Geels multilevel perspective.

As the arrows in the model indicate, the niches are working with aspects related to the existing regimes. It is the actors, who support the niches, that desire that the novelties invented will be used in the existing regime or even replace it. Geels theory on transition thus operated with a number of dynamics. There are promoting factors from within the dominant regimes, but most importantly from niches challenging the dominant regimes and possible commencing “conceptual” competition in a window of opportunity. The model below shows how a novelty in a technological niche goes from being “just” a novelty to a part of the dominant regime.

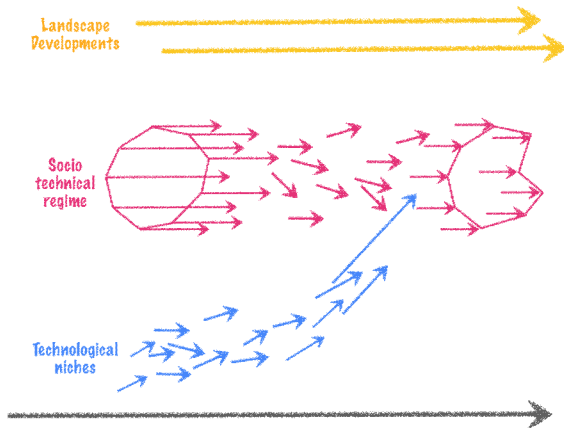


Figure 2. Transition in the multilevel perspective.

4 THE CONCEPTUAL MODEL

Cleantech Niche Development as understood as a way of acting for Cleantech companies which enables them to move up in the Cleantech landscape as defined. As the model below shows we see Cleantech Niche Development as being able to carry out leadership, micro niche management as well as business development at the same time.

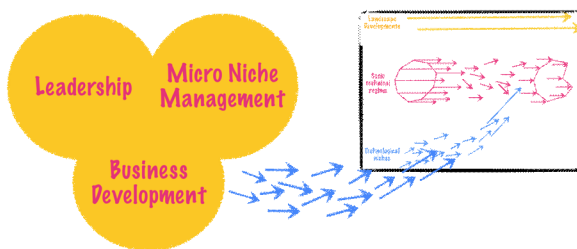


Figure 3. The conceptual model

A description on what these three areas consist of in more detail is provided below. Followed by an indepth discussion on three selected aspects networking, strategizing and cleantech marketing.

4.1 Leadership

Four components are incorporated in the conceptualization of leadership here. These four aspects are: To develop a vision (to create a meaning and a path for people), Networking (the ability to establish a network around you), Interestment, the process of getting people interested and participate in a promoting alliance [6] (Callon 1987) and institutional entrepreneurship, the ability to innovate in a field of complex private and public institutions [7]. As it derives the conceptualisation of leadership shares features with other leadership concepts such as Kotter's [8].

4.2 Micro Niche Management

As mentioned Micro Niche Management is derived from the term Strategic Niche Management (SNM) which is a policy tool primarily aimed at external bodies intentions of supporting niches. As Hoogma notes: 'Strategic Niche Management is a policy tool that can contribute to successful niche creation for new technological options' [9]. On the basis of the research carried out on SNM in several businesses, Schot and Geels conceptualize six policy dilemmas for niche development [10]. They include two types of learning aspects, networking, protecting, visioning and the relationship between local projects and global rule. One learning dilemma addresses the variety of ideas and solution pursued inside a niche. A high variety is attractive to facilitate learning a several different elements in future avenues for development. Yet it the niche involves too many variants of ideas and possible solution the limited resources of the niche players would hamper directed cumulation of a future superior technology as compares to other initiatives in the niche.

A high variety may also involve a perception of risk and uncertainty when vesting interest in one or another early solution thus delaying strategic decisions by producers customers, and policy makers. The vision dilemma involves the tension between strategizing through flexible agile maneuvering according to for example changing circumstances, such as the recent nuclear incident in Japan, which could be believed to enable certain cleantech niche products, and thus constitute a window of opportunity. Versus staying with an already well developed and explicit vision even if immediate external responses, and inputs does not confirm it.

Schot and Geels describe first and foremost how the *political* forces from outside (regulators, public business development policy makers) should work with niche management [10]. Where the entire set of dilemmas might not fit directly to our aim, since it is more of a inside out business perspective.

Nevertheless are some of the topics very usable for the business perspective. And we believe that we can extract the following components as parts of Micro Niche Management:

- Vision
- Networking
- Management of technology
- Political aspects
- Social relations

4.3 Business Development

As with leadership and Micro Niche Management

the definition of what business development is, is tentative. Basically it consist here of a row of business areas commonly assumed to be important for business management and leadership. Naidu & Rao, in their discussion of management and of entrepreneurship point at five main areas of management for all sizes of enterprises [11]: planning, organizing, staffing, directing (leadership) and controlling (finances). They extent these basic areas with a number of further ones such as communication, marketing, product development, sales, distribution and operation management [11]:1. Illustrating the difficulties in pointing at primary areas of business development. For cleantech companies hypergrowth [5], and political issues [12] probably are additional important areas. Therefore the following business development components are perceived as central:

- Financing
- Marketing
- Strategy
- Organisational growth
- Social relations
- Management of technology
- Political aspects
- Institutional entrepreneurship

There are clear overlaps between the niche management discussion above and the business development dimensions. Vision and Finance is therefore merged with Political aspects and Interestement with Strategy. This gives us our initial model of what Cleantech Niche Development could consist of: micro niche management, business development and leadership. The model below shows the five parameters crucial to Cleantech Niche Development and covering micro niche management (MNM), business development (BD) and leadership (L).

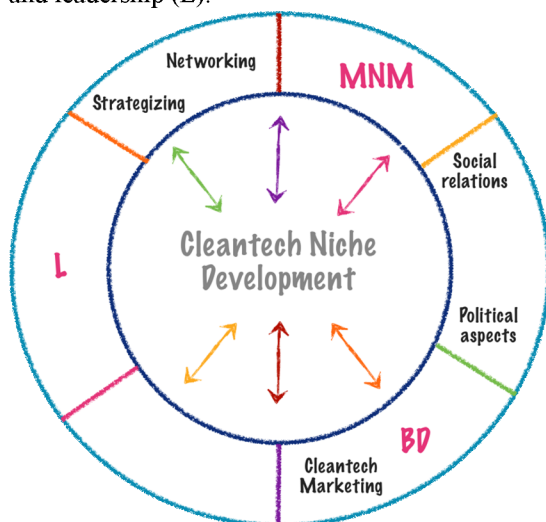


Figure 4. Cleantech Niche Development
A short presentation of why these five elements are

considered especially important:

Strategizing: Strategizing in Cleantech niche companies is a more looping task due to the high degree of flux created by hypercompetition. Cleantech niche companies have another aspect to play on when it comes to working with vision as their vision can make meaning for the individual employee.

Networking: The ability to network is very important for Cleantech niche companies. Many small new Cleantech companies will find themselves acting

in an immature business in an immature market without any standards and with very few networks. In order to create a coalition and get knowledge Cleantech niche companies need to go out and do some networking.

Social relations: The difference for the Cleantech companies compared to others when it comes to social relations is that a lot of companies have to fight the NGO's because they are polluting or harming nature. The Cleantech companies can actually collaborate with them. The Cleantech companies can furthermore get positive influence by the social hype about Cleantech created, among others, by celebrities.

Political aspects: Decisions and political involvement has a great impact on Cleantech business and can be said to be involved in the business and its development in many different aspects. The political aspect can influence the Cleantech business in many ways, such as: Technology push, Market pull – using the carrot or the stick. Set-up of networks and functions to help development and innovation. Help create standards The main aspect niche Cleantech companies wish to get help for is financing for their development i.e. technology push.

Marketing: Branding of Cleantech companies do not differ from companies in other business areas but Cleantech marketing for green products do.

Cleantech companies have to go beyond one of the products main attributes – the green factor - to actually sell it.

When looking at the five special components it is clear that they all have an external perspective. This is one of the special things for niche companies that they are in both an upward and a sideward movement in the landscape. This movement creates a changing and complex environment requiring the Cleantech niche companies to have a high focus on the external environment.

4.4 Networking

The reason why the role of networking is more important in the Cleantech area is because there is no “dominant” way of doing things. The market is immature which means the networks in the market is not widespread and well build up. The companies therefore tend to share ignorance together with

learning from each other's mistakes.

The companies have to gain a lot of competences to get influence in the emerging market. The interaction and cooperation between the different Cleantech actors is important and essential for innovative and sustainable solutions. Only creating solutions to meet legislation demands does however not create truly innovative products due to the lack of potential synergies with other key stakeholders [13].

According to Passel these stakeholders are: other Cleantech companies, Research centers, Cleantech consumers, Government, and Cleantech investors. Cleantech companies have the will and motivation to develop environmental solutions and via cooperation with research centers for example essential knowledge can be forged into both economic and environmental oriented solutions.

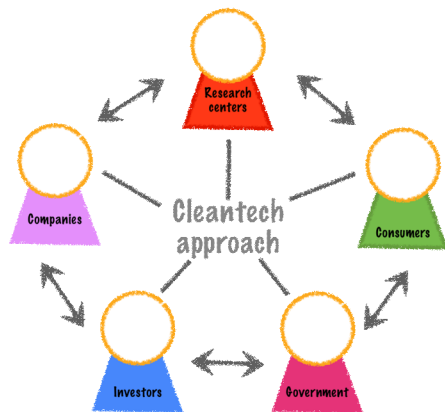


Figure 5 - Passel's Cleantech approach [13]

The companies have to understand and use many actors in the process to be successful in the Cleantech market. As mentioned above the different actors have a special role, and can all be used to gain advantage in the market. Examples of this are how companies interact with NGO's or government and push the decisions and awareness in their direction. If a company can master this they will get competitive advantage.

Unfortunately most of the research in Danish Cleantech companies is made internally [4]. This means that more than 50% of all innovative activities carried out in this sector are made inside the company [4].

A lot of the smaller companies need finance for the development, and to get that investors demand that their inventions (both technology and service) are patented to secure the companies intellectual property (Interview, Østjysk Innovation). This process is long and expensive and many companies feel they are forced to do their development behind closed doors without involvement from others and thereby delimit them of potential synergy from networks.

The situation is complex. On one hand the Cleantech companies are dependent on their investors who want the business idea to be secret and on the other hand the best way to gain success in the market is by sharing knowledge in a network.

A smaller Cleantech company has stated that the large progression happens when you start to share ideas with people outside the company. You have to train yourself in the elevator pitch to become wiser on you product and business case, and get new eyes on your Cleantech solution (Interview, Innogie Aps).

If a company have to invent radical innovations it is vital that they do not isolate themselves. The effect of isolation hinders or encapsulates radical innovation. They have to work with "outsiders" who think out of the box and have new ideas [3].

The Cleantech Leaders are therefore facing several paradoxes – between going out and getting a great network that can help them increase the value of their solution and by involving financial players demand intellectual property protection, meaning that the company cannot go public or market their product before this is solved. Either Cleantech companies have the financial means which implies they can carry on without the involvement of venture capitalists or they do not, in which case they must be very strategic with the networks they try to establish. In order for the Cleantech Leaders to be strategic with their networking they need to have profound knowledge about their technology and their limitations – they must furthermore have a bulletproof elevator pitch in order for them to attract the players they wish to engage with.

So to get the best out of their networking they must look in before looking out – they must know their own strengths and weaknesses. First then will they be able to have a strategic approach to networking when looking out.

4.5 Strategizing

The Cleantech industry is in a hypercompetitive environment where a competitive advantage cannot be sustained over a longer period due to frequently changing standards, rules and other parameters creating a market disruption [14], [5]. D'Aveni believes that competition takes place within four different arenas [15]:

1. *Cost and Quality: Affecting cost and reducing price or affecting quality and increasing price or as Porter described his three generic strategies: Cost leadership, Differentiation or Focus strategy [16].*
2. *Timing and know-how: A competitive advantage can be based upon a company's ability to be first to have unique knowledge and develop that knowledge into assets.*

3. **Strongholds:** *The ability to create entry barriers for competitors to enter your marketplace, industry, segment or geographic region.*
4. **Deep pockets:** *Assets in form of a larger resource pool and the superiority in form of size over a smaller competitor.*

While cost and quality, timing and know-how, strongholds, and deep pockets have always played a role in competition, the difference today is the speed and aggressiveness of interaction in these arenas [15]. Old strategy concepts, such as Strategic fit and Strategic planning are focusing on sustaining the above mentioned 4 advantages: In markets with hypercompetition all these advantages will disappear quickly due to the increased globalization, change of legislation, increased use of strategic alliances, fast technology and product development and other various factors beyond a single company's control.

A forward thinking company should therefore not wait for others to disrupt their advantage as no advantages are sustainable for a long time in a hypercompetitive environment. A forward thinking company realize that they have to disrupt the market themselves if they wish to continue to be the market leader.

Cleantech companies and especially established Cleantech companies should therefore not rest on their laurels doing nothing or trying to sustain their competitive advantage. We are currently witnessing the world's leading wind turbine manufacturer Vestas Wind Systems (with 30 years of experience) being under enormous competitive pressure from not only "old" competitors but surprisingly many new competitors is entering the market [17]. And the wind turbine industry should be seen as a market which is been considered as having a very high entrance barrier in form of knowledge, R&D costs and supply chain issues.

D'Aveni has developed The New 7's – which focuses on finding and building temporary advantages through market disruption rather than trying to sustain a current advantage like the old McKinseys 7's.

The New 7's's	The Old 7's's
<ul style="list-style-type: none"> • Superior stakeholder satisfaction • Strategic soothsaying • Positioning for speed • Positioning for surprise • Shifting the rules of the game • Signaling strategic intent • Simultaneous and sequential strategic thrusts 	<ul style="list-style-type: none"> • Strategy • Structure • Systems • Style (how management behaves); • Staff • Shared-values • Skills

Figure 6 - The new 7's [15].

Hypercompetition demands a broader understanding of strategizing in order to manage such a dynamic environment. This is considered to be (see figure 7 below)[15]:

1. The ability to envision the next series of disruptions in the market, which results in a superior level of stakeholder satisfactions.
2. Some general capabilities that allow the company to carry out any market-envisioned disruptions with greater impact, no matter which type of disruption has been envisioned.
3. Specific tactics that are used to deliver the disruptions to the market with greater effectiveness.

<ul style="list-style-type: none"> • Superior stakeholder satisfaction • Strategic soothsaying • Positioning for speed • Positioning for surprise • Shifting the rules of the game • Signaling strategic intent • Simultaneous and sequential strategic thrusts 	Vision for disruption
	General Capabilities for Executing Disruption.
	Product/Market Tactics Used to Deliver the Disruptions.

Figure 7 - The new 7's modified

We believe these competences are very important for a company in the Cleantech industry to have where fierce competition rules. In order to understand the dynamic of strategy interactions over long periods of time the new 7 S's are concerned with four key goals [15]:

1. Disrupting the status quo: *Move*

competition up the escalation ladder, restart the cycles, or jump to a new area.

2. *Creating temporary advantage: Get better knowledge about costumers, technology and the future. The advantages are short-lived.*
3. *Seizing the initiative: Move aggressively in each area, act to create new advantage or undermine a competitor's old advantage. If done correctly the initiator is proactive, while competitors are forced to be reactive.*
4. *Sustaining the momentum: Create several actions in a row. Don't wait for competitors to catch up.*

If you as a company manage and reach these goals continuously we believe your company is able to compete over a longer period of time. What works today will not work tomorrow; there is no generic strategy to a sustainable competitive advantage besides an entrepreneurial and intrapreneurial approach to discover new opportunities which enable a creative destruction of competitors' advantages. Only this can secure future profits.

4.6 Cleantech marketing

Cleantech Marketing can roughly be divided into two aspects which are marketing of the products and a more broad marketing of the company – branding. When discussing marketing of Cleantech products the focus is on the attributes of the individual products where one of the main attributes of the product is the product being green or sustainable. When talking about branding of a company as green or environmentally friendly the focus is possibly more on aspect such as reducing the company's pollution and on Corporate Social Responsibility – and not on selling an individual product. The green branding of companies is not something exclusively for Cleantech companies, but also involves other sectors. When Cleantech Niche Management is being able to move from niche towards dominant regime you have to go mainstream excluding the possibility to have a high end product. As argued earlier marketing is about having the customer in mind and Pernick and Wilder have argued for five steps to have in mind when dealing with Cleantech products [5].

Here are the five steps:

1. It's all about the costs: If you want to move your product from a niche to mainstream you cannot be thought of as a premium item.
2. Don't Lead with the environment: Innovation, financial savings are good selling points,

saving the planet is unfortunately not. Guilt and altruism do not sell – superior product do among other tangible benefits.

The entrepreneur company Innogie making solarpanels integrated in the roof for private households (Interview, Innogie ApS) originally commenced their business case by listing all the benefits their products did for the environment and design as a sales argument. Now they list primarily economical calculations for potential buyers and secondary the “green factor”.

3. Framing and Naming are critical: It is essential that users identify the name and context of your solution to understand your value proposition correct.

Phillips had problems selling their CFL bulb named Earth bulb despite several marketing attempts emphasizing on environmental benefits. After renaming it to Marathon bulb and no additional marketing, Phillips witnessed a double digit growth when people suddenly associated the bulb with long life span and other more tangible benefits [5].

4. It Has to Be Easy, Accessible, and Convenient: As a customer why should you settle for second best, change behavior or live in fear of breakdowns? Convenience, affordability, and reliability come before sustainability.

5. Remember the Cool Factor: Successful marketing should always create a buzz and people should be proud of using your products, services or solutions.

The Hollywood A-list are standing in line telling how they are contributing to a better environment by driving electrical sports cars like the Tesla Roadster or the hybrid Toyota Prius. Better ambassadors are hard to find!

These five steps are generic and cover mostly the consumer market but still give us a pretty good idea that Cleantech marketing is different from “normal” marketing. Cleantech companies delivering professional product and services to business customers are able to create prices on the superior quality of the products [5]. The argument listed above, that you cannot sell your product just on the green factor – the product needs to fulfill the performance requirements and to have the right price, is not unambiguous and relates to market segments [4].

Cleantech Leaders therefore have to acknowledge that fact and think beyond the green factor and focus on the customer to meet both social and technical demands and to set prices and quality accordingly.

5 CONCLUSIONS

The aim of this paper is to conceptualise cleantech niche development with a special view to leadership of cleantech niche companies. The adopted transition theory leads to an understanding of niche companies competing with an incumbent regime, where proper niche development at certain windows of opportunity could establish themselves as the new future climate mitigating regime. With root in this theoretical part, and linking up with the empirical findings the paper developed an argument that Cleantech Niche Development have some special characteristics. They occur in the areas of strategizing/ visioning, networking, intersement (social relations), marketing and political relations. The characteristics on networking, strategizing and marketing was especially dealt with.

Networking was described as an ambiguous endeavour for the Niche companies, since intellectual property right issues would hamper or free networking processes

Strategizing was conceptualised arguing for Niche companies to try and create their own markets, mastering soothsaying and agile internal organisation amongst other things

Cleantech marketing as segmented with a more clearly cautious strategy on consumer markets where easy benefits from merely being green should not be expected. Yet supplier to professional business market seem to have option to sell on quality and higher price levels.

The analysis shows that some of the overall competences the Cleantech Leaders should possess are the ability to act in chaos and the ability to act upon the paradoxical and complex surroundings while making meaning for their co-workers and network. If doing so there is a chance that the niche would indeed 'take off' and overtake the present non sustainable incumbent regime's place.

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